

AMENDMENTS TO THE CLAIMS

Please amend the Claims as follows. Insertions are shown underlined while deletions are ~~struck through~~.

1 (currently amended): A reformer for obtaining a synthesis gas by partially oxidizing a carbon-containing raw gaseous material and then steam-reforming the oxidized raw material, the reformer comprising:

a single reactor vessel including a catalyst layer for promoting a steam reforming reaction and a shift reaction,

an oxidizing agent feed pipe for feeding an oxidizing agent into the vessel, and

a carbon-containing gaseous raw material feed pipe for feeding the carbon-containing gaseous raw material into the vessel, said pipes separately opening into the vessel,

wherein the central axis of the oxidizing agent feed pipe and the central axis of the carbon-containing gaseous raw material feed pipe intersect with each other downstream of the outlet of the oxidizing agent feed pipe in an oxidizing agent flowing direction and downstream of the outlet of the carbon-containing gaseous raw material feed pipe in a carbon-containing gaseous raw material flowing direction.

2 (currently amended): The reformer according to Claim 1, wherein the central axis of the oxidizing agent feed pipe and the central axis of the carbon-containing gaseous raw material feed pipe intersect with each other at an angle of 80 to 100°.

3 (currently amended): The reformer according to Claim 1, wherein the following relationships are satisfied:

$$40 \leq V1 \leq 150 ;$$

$$0.2V1 \leq V2 \leq 0.8V1 ; \text{ and}$$

$$\min(0.5D2, 7.0D1) \leq L1 \leq \max(0.5D2, 7.0D1),$$

wherein D1 (m) is an equivalent hydraulic diameter of the outlet of the oxidizing agent feed pipe,

D2 (m) is an equivalent hydraulic diameter of the outlet of the carbon-containing gaseous raw material feed pipe,

V1 (m/sec) is an average flow velocity of oxidizing agent jet at the outlet of the oxidizing agent feed pipe,

V2 (m/sec) is an average flow velocity of carbon-containing gaseous raw material jet at the outlet of the carbon-containing gaseous raw material feed pipe, and

L1 (m) is a distance from the outlet-end of the oxidizing agent feed pipe to an intersection point where the central axis of the oxidizing agent feed pipe and the central axis of the carbon-containing gaseous raw material feed pipe intersect with each other.

4 (original): The reformer according to Claim 1, wherein the cross section of the outlet of the oxidizing agent feed pipe has a circular, oval, polygonal, starry or petal shape.

5 (currently amended): A method for obtaining a synthesis gas comprising:

feeding an oxidizing agent in an oxidizing agent flowing direction into a reaction vessel;

feeding a carbon-containing gaseous raw material in a carbon-containing gaseous raw material flowing direction into the vessel separately from the oxidizing agent to partially oxidize the carbon-containing raw material,

wherein the oxidizing agent flowing direction and the carbon-containing gaseous raw material flowing direction intersect with each other inside the vessel to contact the oxidizing agent and the carbon-containing gaseous raw material; and

steam-reforming the oxidized raw material in the vessel in the presence of a catalyst for promoting a steam reforming reaction and a shift reaction.

6 (currently amended): The method according to Claim 5, wherein the oxidizing agent flowing direction and the carbon-containing gaseous raw material flowing direction intersect with each other at an angle of 80° to 100°.

7 (currently amended): The method according to Claim 5, wherein the oxidizing agent is fed through an oxidizing agent feed pipe, and the carbon-containing gaseous raw material is fed through a carbon-containing gaseous raw material feed pipe, wherein the following relationships are satisfied:

$$40 \leq V1 \leq 150 ;$$

$$0.2V1 \leq V2 \leq 0.8V1 ; \text{ and}$$

$$\min(0.5D2, 7.0D1) \leq L1 \leq \max(0.5D2, 7.0D1),$$

wherein D1 (m) is an equivalent hydraulic diameter of an outlet of the oxidizing agent feed pipe,

Appl. No. : 10/633,826
Filed : August 4, 2003

D2 (m) is an equivalent hydraulic diameter of an outlet of the carbon-containing gaseous raw material feed pipe,

V1 (m/sec) is an average flow velocity of oxidizing agent jet at the outlet of the oxidizing agent feed pipe,

V2 (m/sec) is an average flow velocity of carbon-containing gaseous raw material jet at the outlet of the carbon-containing gaseous raw material feed pipe, and

L1 (m) is a distance from an end of the outlet of the oxidizing agent feed pipe to an intersection point where a central axis of the oxidizing agent feed pipe and a central axis of the carbon-containing gaseous raw material feed pipe intersect with each other.

8 (previously presented): The method according to Claim 7, wherein the cross section of the outlet of the oxidizing agent feed pipe has a circular, oval, polygonal, starry or petal shape.